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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/483,569	01/14/2000	Stehpen S. Oh	TI-23373	8551

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EXAMINER	
OPSASNICK, MICHAEL N	
ART UNIT	**PAPER NUMBER**
2626	

DATE MAILED: 07/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/483,569	OH ET AL.	
	Examiner	Art Unit	
	Michael N. Opsasnick	2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *received on 19 June 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3 and 9-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 9-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-3,9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bloebaum et al (6070137) in view of Oppenheim (Discrete Time Signal Processing, pp 57,59,60,542-543,548)..

As per claims 1 and 9, Bloebaum et al (6070137) teaches:

Receiving a stream of sampled acoustic signals and digitizing each sampled acoustic signal thereby forming digital samples (sampler, Fig. 3, element 26),

selecting a fixed number of digital samples by multiplying the digital samples by a windowing function (signals converted into frames, col. 4, lines 24-25),

computing the Fast-Fourier-Transform of the selected windowed digital samples to yield transformed windowed signals (DFT, Figure 3, element 42 with col. 5, lines 10-1 1),

selecting half the Fourier-transformed windowed signal data (single-sided, frequency-domain representation because of the complex-conjugate symmetry of a Fast Fourier Transform of real signals, col. 5, lines 8-10),

calculating a power estimate (power spectral density, col. 5, lines 17-19),

calculating a smoothed power estimate over time by smoothing the power estimate using the recited (i.e., first-order AR smoothing) equation (Fig. 5, element 64 with "smoothed version of S" in col. 8, lines 6-8, cf. first-order AR smoothing, col. 5, lines 38-44), wherein noting that S is signal power with signal present and noise power when signal is absent. thus also calculating a noise estimate,

calculates a gain function from the signal and noise power estimates (enhancement filter, col. 6, lines 8-10), and

calculating a transformed signal by multiplying the gain function with the transformed windowed signal (col. 6, line 35-41).

Bloebaum et al are interested in speech (voice) coding rather than speech decoding, and thus do not explicitly teach calculating an (enhanced) speech signal! By calculating an inverse FFT on the transformed window signal to yield a sampled speech signal. However this is suggested by them, since the examiner takes Official Notice that an artisan at the time of invention would have known, from her required digital signal analysis course, to obtain back a time domain version thereof, consisting of a sampled speech signal, for playback to the listener.

As per claims 1,9, Bloebaum et al (6070137) teaches the smoothing function in the frequency domain (col. 5 lines 60-65). Bloebaum et al (6070137) also teaches using a linear or circular convolution to perform this smoothing function (col. 6 line 1-6). Examiner notes that Bloebaum et al (6070137) does not expand upon the time domain equivalent of this calculation, however, Oppenheim (Discrete Time Signal Processing, pp 57,59,60,542-543,548) explicitly teaches that a convolution in the frequency domain (page 60, equation 2.151) is a multiplication

in the time domain (page 60, equation 2.150). Therefore, it would have been obvious to one of ordinary skill in the art of signal processing to recognize that the convolution based smoothing function as taught by Bloebaum et al (6070137) has a time based smoothing equivalent because of the duality nature of the Fourier transform and that the convolution of Fourier transforms are equivalent to the multiplication of the sequences (Oppenheim (Discrete Time Signal Processing, pp 57,59,60,542-543,548), page 60, first textual paragraph).

As per claims 2 and 10, the combination of Bloebaum et al (6070137)in view of Oppenheim (Discrete Time Signal Processing, pp 57,59,60,542-543,548) does not teach a frame size of 32 samples. However, the examiner takes Official Notice that it was well known at the time of invention to use a "power of two" sample size for FFT processing and that standard speech frame sizes are 2.5, 5, 10, and 20 milliseconds, and that 32 samples would correspond to somewhere between 5 and 2.5 milliseconds of speech data at the standard sampling rates. It would have been obvious for one of ordinary skill at the time of invention to use such standard speech frame sizes so as to enable her to use conveniently-available standard signal processing hardware and software.

As per claims 3 and 11, the combination of Bloebaum et al (6070137)in view of Oppenheim (Discrete Time Signal Processing, pp 57,59,60,542-543,548) does not say what inherent window they are using. However, the examiner takes Official Notice that at the time of invention it was notoriously well-known to use a Hanning (raised cosine) window. It would have been obvious for one of ordinary skill at the time of invention to use a Hanning window, because of its enables one to do easy "unwindowing" by the addition after inverse FFT, when using 50 percent time frame overlap.

Response to Arguments

3. Applicant's arguments received on 6/19/06 have been fully considered but they are not persuasive. As per applicants arguments pertaining to Bloebaum's teaching of smoothing, (page 6 of the response), the middle of page 6 of the response, bottom; page 9, first ten lines), examiner notes that 1), the addressing of time domain smoothing is based on the combination of Bloebaum in view of Oppenheim; 2) and that the Bloebaum reference is used to introduce a frequency based convolution smoothing. As per applicant's arguments that claim 1&9 do not recited multiplication in the time domain, examiner argues that the mathematical equivalent to the convolutional frequency based smoothing is a multiplication based smoothing in the time domain. Examiner recommends adding further claim limitations as to the function that is used to perform smoothing, if applicant wishes to argue how the smoothing is performed, Furthermore, time based multiplicative smoothing is well known to one of ordinary skill in eh art of signal processing (e.g., time based averaging, time based windowing (Hanning, Hamming etc.), etc.). Oppenheimer teaches us the mathematical equivalent of frequency based convolution – time based multiplication, and therefore the combination of Bloebaum (frequency based convolutional smoothing) in view of Oppenheimer (frequency based convolution to time base multiplication) yields us a teaching of time based multiplicative smoothing. As per applicant arguments on page 8 (with respect to smoothing the power estimate), Bloebaum does teach a power estimate smoothing (as noted in the office action and applicant's admission – page 7 of the response, lines

1-2). In addition, Bloebaum noise estimate includes signal (see previous arguments in the previous office action with respect to non-speech).

Conclusion

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Opsasnick, telephone number (571)272-7623, who is available Tuesday-Thursday, 9am-4pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Richemond Dorvil, can be reached at (571)272-7602. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

7/10/06
mno

Michael N. Opsasnick
Examiner
Art Unit 2626